



Figure 5. Compound eye of adult male *S. pacifica*. Longitudinal sections of two adjacent optic units (a) and theoretical optical system (b).

REFERENCES

- Bohart, R.M. 1941. A revision of the Strepsiptera with special reference to the species of North America. Univ. Calif. Pub. in Ent. 7(6): 91-160 (Plate 3, 8 Figs.).
- Gehrhardt, E.E. 1939. The morphology of the adult female *Stylops pacifica* Bohart. (Strepsiptera, Kirby). Unpublished M.S. thesis in library, Univ. Calif., Berkeley.
- Hausmann, E.E. and E.P. Slack. 1939. Physics. Van Nostrand, New York, 2nd ed.
- Hesse, R. 1901. Untersuchungen über die Organe der Lichtenpfindung bei niederen Thieren. VIII. Von den Arthropoden-Augen. Zeitschr. wiss. Zool. 70: 347-473.
- Pankrath, O. 1890. Das Auge der Raupen and Phryganidenlarven. Zeitschr. wiss. Zool. 49: 670-708. (Illustrations only).
- Snodgrass, R.E. 1935. Principles of Insect Morphology. McGraw-Hill, New York and London, 1st ed.
- Strohm, K. 1910. Die Zusammengesetzten Augen der Männchen von *Xenos rossi*. Zool. Anz. 36:156-159.

Larvae of *Hyalophora euryalus kasloensis* (Lepidoptera: Saturniidae)

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There are no currently recognized subspecies of the ceanothus silkmoth, *Hyalophora euryalus* (Boisduval) (cf. Ferguson 1972, Lemaire 1978; see Packard 1914, McDunnough 1921 for discussion of specific synonyms); however, the status of *H. e. kasloensis* (Cockerell) has been debated for many years. The subspecific name *kasloensis* was published by T.D.A. Cockerell in Packard's (1914) monograph and was described as representing "a local [submelanic] race occurring in the interior of British Columbia" which was originally described, but not named, by Cockle (1908). Based on surveys of wild

moths and some very limited hybridization studies, Sweadner (1937) concluded that *H. e. kasloensis* represented an intergrade population between *H. euryalus*, native to the Pacific coast and western mountains, and *H. gloveri* (Strecker), native to the Rocky Mountain region. It has since been well-established that interspecific crosses in the genus *Hyalophora* Duncan produce hybrids consisting of fertile males and sterile females (Collins 1973). This fact, combined with the apparently intermediate characters of adult *H. e. kasloensis*, led Ferguson (1972) to speculate that *H. e. kasloensis* arose through a period of hybridization between *H. euryalus* and *H. gloveri* with extensive backcrossing of hybrid males to *H. euryalus* females, resulting in a population that is essentially *H. euryalus* but that retains enough of the *H. gloveri* gene pool to produce a distinct form. He concluded by reducing the name *kasloensis* to the status of a synonym of *H. euryalus*, but not before noting that the larva of *H. e. kasloensis* "has never been adequately described". The existence of a distinct larval phenotype in *H. e. kasloensis* has long been suspected (Sweadner 1937, Collins and Weast 1961, Collins 1984) but has never been documented.

In May 1988 a small colony of *H. e. kasloensis* was established from an adult female collected at Kelowna, B.C., and larvae were reared on cuttings of redstem ceanothus, *Ceanothus sanguineus* Pursh (Rhamnaceae), under ambient conditions in the Okanagan Valley. The colony was maintained and enlarged by mating several reared females with wild males at Kelowna in 1989 and at OK Falls in 1990 using mating cages constructed from coffee cans, as described by Miller and Cooper (1976). Larvae were reared on *C. sanguineus* cuttings in the Okanagan during the summer of 1989 and on cuttings of cascara, *Rhamnus purshiana* DC. (Rhamnaceae), and Douglas-fir, *Pseudotsuga menziesii* (Mirb.) Franco var. *menziesii*, in Victoria during the summer of 1990. Cascara was chosen as an alternate food plant because of its relationship to ceanothus and because it is quite common around Victoria whereas ceanothus is very scarce on Vancouver Island. Douglas-fir was offered as a food plant because *H. euryalus* larvae have been found locally in Douglas-fir seed orchards. A series of specimens (eggs and neonate through 5th instar larvae) from the 1990 generation was deposited at the Royal British Columbia Museum [catalogue numbers ENT991-64042 through ENT991-64051].

The species was initially identified as *H. euryalus* based on the collection locality, the wing patterns of the adults, and the apparent preference of the larvae for ceanothus as a food plant. Eventually, however, it became obvious that the larvae did not match published descriptions for larvae of *H. euryalus*, in which all of the dorsal scoli in 4th and 5th instars are bright yellow (cf. Arnett and Jacques 1981). The reared larvae had red-orange dorsal scoli (Plate 1), with no discernable variation in this character among any of the ca. 250 larvae reared during the past three years. This larval phenotype is distinct from both *H. euryalus*, in which the dorsal scoli are yellow, and *H. gloveri*, in which the dorsal scoli are red-orange in 4th instar but yellow in 5th instar larvae (Ferguson 1972). It is also noteworthy that the form of the dorsal scoli in 5th instar larvae resembles more closely that of *H. euryalus* than that of *H. gloveri* (cf. Tuskes 1976).

H. e. kasloensis shows many characters that are intermediate between *H. euryalus* and *H. gloveri*, particularly in adult wing patterns, and may well have originally arisen through hybridization between these two species as proposed by Ferguson (1972). However, the fact that the larvae show a phenotype that is different from both of the supposed parental species suggests that this form should be considered distinct, particularly when dorsal scoli colouration is used as the primary diagnostic character for distinguishing species in larvae of *Hyalophora* (cf. Ferguson 1972). The name *H. e. kasloensis* seems appropriate because of its apparent affinities with *H. euryalus* and the fact that the specimen designated as lectotype was collected at Kaslo, B.C. (Ferguson 1972). Further studies, involving cross-breeding with *H. euryalus* and *H. gloveri* as well as surveys of the geographic range of the *H. e. kasloensis* phenotype, are required to firmly establish the taxonomic status of this distinct form of *Hyalophora*.



Plate 1. Late 4th (top) and early 5th (bottom) instar larvae of *Hyalophora euryalus kasloensis* (Cockerell) (Lepidoptera: Saturniidae) on *Ceanothus sanguineus* Pursh (Rhamnaceae), July 1989.

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REFERENCES

- Arnett, R.H. Jr. and R.L. Jacques, Jr. 1981. Simon and Schuster's Guide to Insects. Simon and Schuster, New York. entry 246.
- Cockle, J.W. 1908. *Samia rubra*. Entomol. News 19:340-341.
- Collins, M.M. 1973. Notes on the taxonomic status of *Hyalophora columbia* (Saturniidae). J. Lepid. Soc. 27:225-235.
- Collins, M.M. 1984. Genetics and ecology of a hybrid zone in *Hyalophora* (Lepidoptera: Saturniidae). Univ. Calif. Publ. Entomol. 104, University of California Press, Berkeley. p. 27.
- Collins, M.M. and R.D. West. 1961. Wild Silk Moths of the United States. Collins Radio Company, Cedar Rapids, Iowa. p. 20.
- Ferguson, D.C. in Dominick, R.B. et al. 1972. The Moths of America North of Mexico, fasc. 20.2B. Bombycoidea (in part). pp. 243-267.
- Lemaire, C. 1978. The Attacidae of America. Attacinae. Edition C. Lemaire, 42 Boulevard Victor Hugo, Neuilly-sur-Seine, France. pp. 114-125.
- McDunnough, J. 1921. *Samia euryalus* Bdv., the correct name for the Californian silk worm moth. Can. Entomol. 53:191-192.
- Miller, T.A. and W.J. Cooper. 1976. Portable outdoor cages for mating female giant silkworm moths (Saturniidae). J. Lepid. Soc. 30:95-104.
- Packard, A.S. 1914. Monograph of the Bombycine Moths of North America, Part III. Mem. Nat. Acad. Sci. 12:224-226.
- Sweadner, W.R. 1937. Hybridization and the phylogeny of the genus *Platysamia*. Ann. Carnegie Mus. 25:163-242.
- Tuskes, P.M. 1976. A key to the last instar larvae of west coast Saturniidae. J. Lepid. Soc. 30:272-276.